

REMARKS

In the Office Action, dated October 22, 2004, the Examiner states that Claims 1-4 are pending and Claims 1-4 are rejected. By the present Amendment, Applicant amends the claims.

In the Office Action, Claims 3 and 4 are rejected under 35 U.S.C. §102(b) as being anticipated by Sada (US 5,997,988). Claim 3 is further rejected under 35 U.S.C. §102(b) as being anticipated by Murase (JP 06248913). Claims 1 and 2 are rejected under 35 U.S.C. §103(a) as being unpatentable over Sada in view of Nishioka (US 6,367,439).

The Applicant has cancelled Claims 3 and 4. With regard to Claims 1 and 2, Applicant respectfully disagrees with and traverses the rejection to those claims.

Claim 1 defines an improvement in a rotation-contacting type valve train using a cam lobe made of an iron based sintered material. A novel feature of Claim 1 is that the surface roughness (Ra) of the cam lobe is limited between the range of 0.4 and 2.2 μm , which eliminates the minute slippage between the cam lobe and the roller follower to reduce friction loss.

An object of Sada is to get the stable capability of forming an oil film on a contact surface by controlling small recesses, which has the advantages of durability or longer operating life but does not include the advantage of the present invention, namely "elimination of minute slippage". According to the results of the examples shown in Table 1 in Sada, Sada is particularly concerned with the prevention of the generation of peeling and wearing of the contact surfaces so that the durability can be improved.

For the outer peripheral surface of the cam lobe, Sada only describes that the drive wheel 60 having an outer peripheral surface with 3 μm of maximum height "Ry" for a test piece, corresponding to a cam lobe, prepared and used in the durability test in column 6, lines 57-67. The drive wheel 60 is not an iron based sintered material, as claimed, and the cam lobe does not have a surface roughness of 1.4 μm or 1.1 μm . In Sada, the 1.4 μm and 1.1 μm measurement is the maximum height "Ry" for the rollers, not the cam lobe. Furthermore, the maximum height "Ry"

parameter is different from the surface roughness "Ra" (arithmetical mean roughness) parameter that is claimed.

Nishioka describes a cam lobe made of an iron based sintered material, but the cam lobe is for a slide contact type valve train. An object of Nishioka is to maintain fluid lubrication of the slide surface by improving the oil film holding function based on Sm character, hmin character, or the like, for a slide contact type valve train. According to the results of examples shown in Table 1 in Nishioka, Nishioka is particularly concerned that the contact surfaces are prevented from generation of peeling wearing so that the durability can be improved.

Furthermore, the "Rz" parameter that is described is "ten-point roughness" which is a different parameter than the surface roughness "Ra".

It would be difficult for a cam lobe made of an iron based sintered material, as such as is disclosed in Sada and Nishioka, to find a range of "Ra" as defined by the present claims, in which the minute slippage between the cam lobe and the roller follower can be eliminated and friction loss can be reduced in a rotation-contacting type valve train using a cam lobe made of an iron based sintered material. Furthermore, the surface parameters in each do not correspond to the surface roughness claimed. A person skilled in the art looking to reduce cam lobe/roller slippage would not realize from the teaching of these references the claimed invention.

Attached is a copy of JIS B 0601 that further describes the differences between the "Ra", "Ry" and "Rz" parameters.

In Sada, the small recesses that are described are formed on a surface of a matrix formed on a non-sintered material. In contrast, in Nishioka, small concave portions are formed on a surface of a sintered matrix. These small recesses and small concave portions are not equivalent, just as the Ry and Rz surface roughness parameters that are disclosed are not equivalent to the Ra parameter used in the present claims. The differences can most easily be seen, in that surfaces of Sada and Nishioka are designed to slip while the surfaces in the present invention do not.

In light of the foregoing response, all the outstanding objections and rejections are considered overcome. Applicant respectfully submits that this

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application should now be in condition for allowance and respectfully requests favorable consideration.

Respectfully submitted,

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Date



Attorney for Applicant
Brian W. Hameder
c/o Ladas & Parry LLP
224 South Michigan Avenue
Chicago, Illinois 60604
(312) 427-1300
Reg. No. 45613